

REMARKS

By this amendment, claims 24 and 25 have been cancelled without prejudice or disclaimer, and claims 1-3, 5 and 7-24 have been amended to more particularly define the invention and clearly distinguish over the prior art of records. Claims 4 and 6 have been previously cancelled. Accordingly, claims 1-3, 5 and 7-24 are pending in the application, of which claims 1, 5 and 15 are independent. Applicant respectfully submits that the above amendments do not add new matter to the application and are fully supported by the specification.

Entry of this Amendment is respectfully requested because it places the present application in condition for allowance, or in the alternative, better form for appeal. In view of the above Amendments and the following Remarks, Applicant respectfully requests reconsideration and withdrawal of the objections and rejections for the reasons discussed below.

CLAIM 14

The Office Action indicates that the previous rejection of claim 14 under 35 U.S.C. §112, second paragraph has been withdrawn. Currently, no rejection is imposed on claim 14. Nevertheless, Office Action Summary indicates that claim 14 is rejected. Clarification on the status of claim 14 is respectfully requested.

Rejection of Claims under 35 U.S.C. §112, Second Paragraph

Claims 15-26 stand rejected under 35 U.S.C. §112, second paragraph as being indefinite. Applicant respectfully traverses this rejection for at least the following reasons.

With respect to claim 15, the Examiner pointed out that there is no support for the “second data voltage”, “second switching element” and “second liquid crystal capacitor”. This assertion is respectfully disagreed.

Fig. 3 shows a pixel structure of an LCD device. As well known, an LCD device comprises a plurality of pixels arranged in a matrix. Fig. 3 shows only one pixel structure, in which a TFT (corresponding to the claimed second switching element) is connected to the data line “d” and the gate line “Gn”. Since each pixel would have the same pixel structure with Fig. 3, there would be another TFT (corresponding to the claimed first switching element) connected to the gate line Gn-1. The data driver 30 in Fig. 2 would generate a data voltage (corresponding to the claimed first data voltage) for the TFT connected to the gate line Gn-1 and another data voltage (corresponding to the claimed second data voltage) for the TFT connected to the gate line Gn.

Also, as well known, every pixel in an LCD device forms a liquid crystal capacitance. Thus, the pixel corresponding to the TFT connected to the gate line Gn-1 would have a liquid crystal capacitance (corresponding to the claimed first liquid crystal capacitance) and the pixel corresponding to the TFT connected to the gate line Gn would have another liquid crystal capacitance (corresponding to the claimed second liquid crystal capacitance).

For these reasons, it is submitted that the claimed features of “second data voltage”, “second switching element” and “second liquid crystal capacitor” are readily apparent from the specification.

With respect to claim 16, the Examiner stated “it is not clear what Applicant means “the first switching element and the second switching element turn on by the second voltage and turn off by the fourth voltage,” line 1-3. However, Fig. 3 shows only one switching element.” (Office Action, page 3).

In this regard, Fig. 5 shows a gate signal $V_g(n-1)$ applied to a TFT (not shown) connected to the gate line G_{n-1} of Fig. 3 and a gate signal $V_g(n)$ applied to the gate line G_n shown in Fig. 3. As mentioned above, the TFT connected to the gate line G_{n-1} is not shown because the pixel structure shown in Fig. 3 is repeated throughout all the pixels. The gate signal $V_g(n-1)$ has a gate-on interval T_2 . The gate voltage $V_g(n-1)$ during the gate-on interval turns on the TFT connected to the second gate line G_{n-1} . The interval following the overshoot interval T_3 turns off the the TFT. Similarly, the gate voltage $V_g(n)$ has the same signal pattern and hence turns on and off the TFT connected to the gate line G_n . Thus, it is submitted that “the first switching element and the second switching element turn on by the second voltage and turn off by the fourth voltage” in claim 16 is readily apparent from the specification.

With respect to claim 17, the Examiner stated “it is not clear what Applicant means “the third voltage of the gate signal applied to the first gate line is higher than the fourth voltage when the first data voltage is higher than the common voltage, and the third voltage of the gate signal applied to the first gate line is lower than the fourth

voltage when the first data voltage is lower than the common electrode," (Office Action, page 3).

Fig. 5 of the present application shows the pixel voltage V_p and the gate voltage $V_g(n)$. The pixel voltage V_p is varied by the data voltage applied to the pixel. Fig. 5 shows the pixel voltage V_p becoming lower than the common voltage V_{com} when the gate is open by the gate voltage $V_g(n)$ during the gate on interval T2. In this case, the gate signal is generated such that the voltage level of the gate voltage $V_g(n)$ in the third interval T3 is lower than the voltage level of the gate voltage $V_g(n)$ in the fourth interval following the third interval. Contrarily, when the pixel voltage V_p is higher than the common voltage V_{com} , the gate signal is generated such that the voltage level of the third interval of the gate voltage $V_g(n)$ is higher than the voltage level in the fourth interval. Thus, it is submitted that the claimed features of claim 17 is disclosed in claim 5 and its corresponding descriptive portion.

With respect to claims 25 and 26, these claims are cancelled in this response. Also, claims 15-24 have been amended for clarification, better wording and informality correction purposes only. Accordingly, Applicant respectfully requests withdrawal of the 35 U.S.C. §112, second paragraph rejection of claims 15-24. These amendments are not made for the purpose of avoiding prior art or narrowing the claimed invention, and no change in claim scope is intended. Therefore, Applicant does not intend to relinquish any subject matter by these amendments.

Rejection of Claims under 35 U.S.C. §103

Claims 1-3, 5 and 7-13 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U. S. Patent No. 6,115,018 issued to Okumura, et al. ("Okumura") in view of U. S. Patent No. 5,841,419 issued to Maltese, et al. ("Maltese"). Applicant respectfully traverses this rejection for at least the following reasons.

With respect to claims 1-3, amended independent claim 1 recites "a gate driver generating stepped-wave pattern gate signals for the gate lines, each stepped-wave pattern gate signal including: a reset interval for *converting a grayscale level of a pixel corresponding to a subsequent gate line to an extreme grayscale level ...*"

In this regard, the Examiner admitted that Okumura fails to disclose or suggest these claimed features. The Examiner further stated "Maltese teaches The LCD device comprising: the second pulse is erasing the previous image ... A last pulse has their peak amplitude of the row voltage (overshoot interval, col. 7, lines 25-27)." (Office Action, page 6).

However, Okumura does not disclose suggest using a step-waved pattern gate signal to convert a grayscale level of a pixel corresponding to a subsequent gate line to an extreme grayscale level, as claimed. This is further evidenced by the fact that, the Examiner even did not assert that Okumura discloses or suggests this claimed feature. Since none of the cited references this claimed feature, it is submitted that claim 1 is patentable over them. Claims 2 and 3 are dependent from claim 1 and hence would also be patentable over them.

With respect to claim 5 and 7-13, amended independent claim 5 recites "each stepped-wave pattern gate signal comprising: a reset interval converting a grayscale level of a pixel corresponding to a subsequent gate line to an extreme grayscale level."

As mentioned above, none of the cited references discloses or suggests this claimed feature. Also, the Examiner did not assert that this claimed feature is disclosed or suggested by the cited references. Thus, it is submitted that claim 5 is patentable over them. Claims 7-13 are dependent from claim 5 and hence would also be patentable at least for the same reason.

Accordingly, Applicant respectfully requests withdrawal of the 35 U.S.C. §103(a) rejection of claims 1-3, 5 and 7-13.

Other Matters

In this response, claims 1-3, 5 and 7-24 have been amended solely for the purposes of informality correction, better wording and clarification. These amendments are not made for the purpose of avoiding prior art or narrowing the claimed invention, and no change in claim scope is intended. Therefore, Applicant does not intend to relinquish any subject matter by these amendments.


Conclusion

Applicant believes that a full and complete response has been made to the Office Action and respectfully submits that all of the stated objections and grounds for rejection have been overcome or rendered moot. Accordingly, Applicant respectfully submits that all pending claims are allowable and that the application is in condition for allowance.

Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact the Applicant's undersigned representative at the number below to expedite prosecution.

Prompt and favorable consideration of this Reply is respectfully requested.

Respectfully Submitted,



Hae-Chan Park
Reg. No. 50,114

Date: October 26, 2005

McGuireWoods LLP
1750 Tysons Boulevard
Suite 1800
McLean, VA 22102-4215
Tel: 703-712-5000
Fax: 703-712-5050
HCP/WSC/alj

\\COM\546204.1